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IBW/1

A PROPOSAL FOR AN ANGLE OF ATTACK INDICATOR IN THE U-2

1. INTRODUCTION The type of angle of attack indicator envisaged for the article is essentially the same as that fitted to the T2A aircraft with the exception of the indexer which is not considered to be essential and would add two instruments to the cockpit instead of one. The installation should prove to be relatively cheap and simple, requiring a small differential preesure sensing probe (about 3" long) located on the fuselage side fairly well forward on the nose(some form of test may be required to find the least disturbed airflow throughout the angle of attack range). The rest of the installation would consist of the electrical connection to the angle of attack indicator in the cockpit, this being a simple needle and dial type instrument.

2. ADVANTAGES

(a) First and foremost it would provide an accurate guide for the pilot with regard to the correct approach speed to adopt, particularly for carrier work. It would eliminate the need for calculation of the threshold speed and would provide an accurate indication of the margin of safety in hand above the stall during all manoeuvres, regardless of the all up weight and regardless of altitude. There may be a slight variation of the stall angle of attack at very high altitudes due to compressibility but the degree of this variation could be easily determined practically.

(b) An angle of attack indicator should be an invaluable aid at high altitude in case of either airspeed indicator or altimeter malfunction. For instance, an erroneous altimeter may cause the pilot to fly the aircraft too fast (if altimeter underreads) or too slowly (if altimeter overreads) thereby making a cruise climb schedule innacurate or impossible and increasing fuel consumption. As there will be an optimum angle of attack at which to fly during a cruise climb, then this instrument would be an excellent cross reference and indeed might be regarded as one of the primary instruments.

(c) The relative sensitivity of the angle of attack indicator at altitude per knot change in indicated airspeed would be of the order of maybe three times that at sea level.

(d) In certain cases the pilot may not know the precise amount of fuel left on board. i.e. a fuel counter malfunction or inability to determine fuel load for any reason after an air to air refuelling. In either of these cases, not only will the pilot be able to adopt the correct approach speed but he will also be able to determine his actual fuel load(maybe not too accurately) by cross referring to a table of all up weight V angle of attack V airspeed. The original all up weight would have to be known of course. Maybe this latter argument, is, on second thoughts, a little too fanciful.

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3. DISADVANTAGES

(a) Another instrument to find room for at the top left of the instrument panel.

(b) Time required to flight test and prove the installation at all altitudes.

(c) The most desireable location for the probe may interfere with other equipment in the nose

4. CONCLUSIONS

(a) All in all it is considered that this instrument would be a valuable aid to the pilot. In some respects it might be regarded as a non essential luxury but it may well prove its value some day by saving an aircraft and/or pilot. To date, as far as is known, two aircraft have been lost through being stalled during the turn on to the final approach. This is not to say that an angle of attack indicator would have prevented these accidents but it would have given the pilots an indication of how close to the stall if attention was paid to it under those circumstances.

(b) In para 1. it was stated that an indexer was not thought to be essential but it would be an added refinement for carrier approaches. After all the indexer is just a system of three lights indicating fast, slow or on speed and the information is taken from the angle of attack indicator.

(c) In the event of a probe proving to be impracticable, an alternative might be a simple vane type of angle of attack indicator. This is also used on some naval aircraft.

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